

EVALUATION OF FELINE RENAL PERFUSION USING CONTRAST ENHANCED ULTRASOUND AND SCINTIGRAPHY

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Introduction/Purpose:

Chronic kidney disease is a common feline pathology. Evaluation of renal perfusion changes is important as they occur early in the disease process, but measuring renal perfusion non-invasively is challenging. The objective of this study was to investigate the ability of contrast-enhanced ultrasound (CEUS) and technetium-99m mercaptoacetyltriglycine (^{99m}Tc-MAG₃) scintigraphy to detect experimentally induced changes in renal perfusion in healthy cats. The hypothesis is that both techniques will be capable of detecting a decreased perfusion after infusion of angiotensin II (ATII).

Methods:

Eleven healthy experimental cats were included. All cats received a vasoconstrictor (2 ng/kg/min ATII) and control treatment (sterile 0,9% NaCl), in a randomized order, with a washout period of 14 days. On both days, renal CEUS and ^{99m}Tc-MAG₃ scintigraphy were performed, starting 15 minutes after the intravenous infusion. The same observer, which was not blinded for treatment, performed all analyses. Statistical analysis (SAS version 9.3) was based on a mixed model with period and treatment as categorical fixed effects and cat as random effect.

Results:

With CEUS, the peak enhancement decreased from 3603 arbitrary units (a.u.) (control) to 2664 a.u. with ATII (- 26%, P=0.04). Furthermore, wash-in perfusion index decreased from 2207 a.u. to 1637 a.u. (P=0.04) and wash-out rate from 704 a.u. to 501 a.u. (P=0.02), representing a slower inflow of microbubbles. No consistent influence of ATII on the perfusion parameters obtained with ^{99m}Tc-MAG₃ scintigraphy was present.

Discussion/Conclusions:

AT II causes vasoconstriction of the afferent and efferent glomerular arterioles, thereby decreasing total and cortical renal blood flow. This study demonstrates that CEUS is a promising technique to detect changes in renal perfusion. These perfusion changes were not depicted by renal scintigraphy. Global renal perfusion is assessed by scintigraphy while regional perfusion up to a microvascular level is assessed by CEUS. Further research is warranted to determine the value of CEUS for diagnosis of naturally occurring diffuse renal pathology.